

Assessment of The Impact of Industrial Effluents on Water Quality of Receiving Some Industries of Bilaspur Area

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ABSTRACT

A study was carried out in Bilaspur to assess the extent of chemical pollution in a receiving ground water as affected by industrial effluents. Some industrial area were analyzed for pH, dissolved oxygen, biochemical oxygen demand, electrical conductivity, suspended solids, nitrate, alkalinity, total dissolved solids, hardness, chloride, fluoride and phosphate in the dry and rainy seasons. The results showed that the effluents were alkaline. While the levels of dissolved oxygen, biological oxygen demand, electrical conductivity, suspended solids, alkalinity total dissolved solids fluoride and chloride were relatively high. Also all parameters were compared with ICMR standards of water quality.

Keywords: Biochemical Oxygen Demand, Chemical Pollution, Industrial effluents.

1. INTRODUCTION

Water pollution is a major global problem which requires ongoing evaluation and revision of water resource policy at all levels (international down to individual aquifers and wells). It has been suggested that it is the leading worldwide cause of deaths and diseases, and that it accounts for the deaths of more than 14,000 people daily. An estimated 700 million Indians have

no access to a proper toilet, and 1,000 Indian children die of diarrheal sickness every day. Some 90% of China's cities suffer from some degree of water pollution and nearly 500 million people lack access to safe drinking water. In addition to the acute problems of water pollution in developing countries, developed countries continue to struggle with pollution problems as well. In the most recent national report on water quality in the United States, 45 percent of

assessed stream miles, 47 percent of assessed lake acres, and 32 percent of assessed bay and estuarine square miles were classified as polluted.

2. STUDY AREA

Bilaspur district is located on the northwestern part of the Chhattisgarh state and is bounded by East longitudes 81°29'02" & 82°27'44" and by North latitudes 21°42'40" & 23°06'58" falling in the Survey of India top sheets nos 64E/16, F/6,7,10 to 16, G/9,13, I/4, J/ 1 to 4,7,8, K/1,5,6. It covers an area of 8569 sq.km. It is surrounded by Durg and Raipur districts on the south, Kawardha and Mandla districts (Madhya Pradesh) in the west, Koriya district in the north, Korba and Janjgir-Champa districts in the east (Plate-I). Bilaspur is the district headquarters and is 120 km away from the State capital Raipur. It is well connected with State capital by road and railways. National Highway No. 200 passes through the town. It is on the Mumbai-Howrah main railway line. The district is well connected by all weathered roads. Industrial area are selected for study are Dagori (coded as S-1) a Large Industrial Area in Bilaspur district and a sponge iron plant is situated in this area and second one is silpahri (coded as S-2) Large industrial area in Bilaspur some of the sponge iron industries are situated here .Third one is Seepat (coded as-S-3) Sipat Super Thermal Power Station is located at Seepat in near Bilaspur district in state of Chhattisgarh. The power plant is one of the coal based power plants of NTPC. The coal for the power plant is sourced from Dipika Mines of South Eastern Coalfields Limited. Fourth

one is Sirgitti industrial area (coded as S-4) were sampling site is Vandana Vidhyut Limited "Biomass Based Power Project" Coal is co-fired with rice to maintain consistency in generation.

3. EXPERIMENTAL

In present investigation four sampling station of Dagori, Silpahri, Seepat and Sirgitti were selected Water sample were collected in the polyethylene bottle of 1.0 liters. Temp, pH, turbidity, electrical conductivity (EC), total dissolved solids were analyzed using Systronic 9 parameter water analyzer, total hardness (TH), total alkalinity(TA) was determined by titrimetric method, Fluoride (F⁻) was determined by using Systronic Spectrophotometer. DO, BOD and chloride (Cl⁻) by standard methods given by NEERI¹⁰, APHA¹. All the glassware first cleaned with tap water, distill water and with solution before final use. The chemical and reagent were used for analysis were of A.R. grade.

4. RESULT AND DISCUSSION

Physical parameters: Temperature of the water sample was varied from 23 to 24°C. The pH of these samples was ranged from 7.42 to 7.76 the pH values were found to highest in the location 2 showing the alkaline nature of the water. The EC of all the four samples were ranged from 247.1 to 544.2 μScm^{-1} . The conductivity values were high in the sample of the fourth location. The turbidity of the samples was measured in the NTU units and the turbidity was ranged from 0.30 to 0.67 NTU results are depicted in table-1.

Chemical parameters: BOD values of the water were ranged from 3.1 to 3.4 mg/l. Chlorides was found to be in the range of 141.18 to 285.5mg/l. Alkalinity was also found to be high in the fourth location .

Fluoride was found to be in the range of 0.43 to 0.99 mg/l. TDS was found to be in the range of 424 to 876 mg/li. Fluoride values were ranged from 0.43 to 0.99 mg/ l results are depicted in table-1.

Table 1- Physico- chemical parameters of water samples collected form Some Industries of Bilaspur Area

S/N	Parameters	Unit	S-1	S-2	S-3	S-4
1	Temperature	°C	24.1	24.4	24.2	23.3
2	P ^H		7.61	7.76	7.96	7.42
3	Electrical Conductivity	µm	448	445.2	247.1	544.2
4	Turbidity	mg/li	0.47	0.35	0.67	0.30
5	TDS	ppt	521.2	424.3	876	667
6	TA	mg/li	425.5	556.8	541.5	475.5
7	Total hardness	mg/li	248	236	272	253
8	Dissolved Oxygen	mg/li	3.1	3.4	3.4	3.5
9	B.O.D.	mg/li	4.3	3.2	5.3	4.1
10	F ⁻	mg/li	0.43	0.51	0.99	0.78
11	Cl ⁻	mg/li	285.5	256.8	141.18	175.26

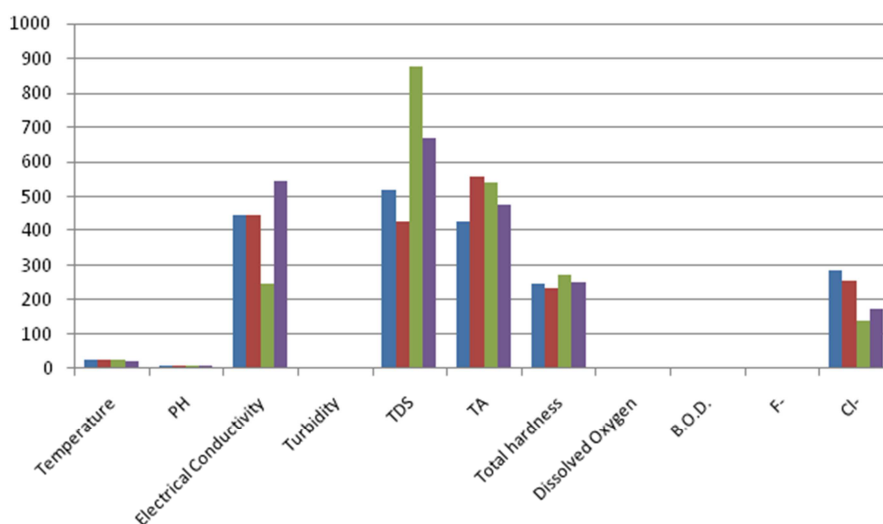


Fig. 1 - Graphical representation of Physico-chemical parameters of water samples collected form Some Industries of Bilaspur Area

Table 2 – Comparison of ground water quality at the study area with drinking water standard (ICMR)

S/N	Parameter	Minimum	Maximum	ICMR (Desirable Limits)
1	Temp (°C)	23.3	24.4	Not more than 40 (°C)
2	P ^h	7.42	7.76	7.0-8.5
3	EC (µm)	247.1	544.2	300
4	TDS mg/li	424.3	876	500
5	Turbidity(NTU)	0.30	0.67	25
6	TH mg/li	236	272	300
7	TA mg/li	425.5	556.8	600
8	F ⁻ mg/li	0.43	0.99	1
9	Cl ⁻ mg/li	141.18	285.5	200
10	DO mg/li	3.2	5.3	6
11	BOD mg/li	3.2	4.1	5

ICMR-Indian Council Of Medical Research

5. CONCLUSION

Thus the present work concludes that the effluent from the industry causes the pollution problems in the surrounding environment. From present investigations we concluded that the quality of most of the water samples under study was not suitable for drinking and domestic purpose.

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